Meta-analysis of epidural analgesia versus parenteral opioid analgesia after colorectal surgery

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CRD summary
The review concluded that epidural anaesthesia does not shorten hospital stay after colorectal surgery, although it significantly reduces pain and shortens the duration of ileus. Rehabilitation programmes may have more impact on length of stay. Despite low study quality and poor reporting of review methods, the review was generally well conducted and the conclusions are likely to be reliable.

Authors' objectives
To assess the effect of epidural anaesthesia (EA) with local anaesthetic on recovery after colorectal surgery.

Searching
MEDLINE (via PubMed), EMBASE and the Cochrane Controlled Trials Register were searched to February 2006 to identify eligible studies; the search terms were reported. Electronic hyperlinks to related articles were checked and the reference lists of retrieved articles were examined. There were no language restrictions.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for inclusion, provided they scored at least 1 on an 8-point quality scale.

Specific interventions included in the review
Studies that compared post-operative EA using local anaesthetic with parenteral opioid or nonopioid analgesia, either patient-controlled, on demand or systematically administered, were eligible. Studies of opioid analgesia alone, single epidural administration, or epidural administration for less than 24 hours were excluded.

The EA groups in the review received thoracic or lumbar bupivacaine (0.1 to 0.25%) or ropivacaine (0.2%), with or without morphine, sufentanil or fentanyl, for a mean of 60 hours post-operatively (range: 24 to 144). All the control groups received opioid analgesia, in most cases parenteral morphine, with or without non steroidal anti-inflammatories. Analgesia was administered by a patient-controlled pump in most cases (10 of the 16 studies).

Participants included in the review
Studies that included patients aged at least 18 years who were having elective colonic or rectal surgery were eligible. Studies of mixed abdominal surgery were included only if the data on colorectal surgery could be extracted separately. Most of the participants in the review (797 out of 806) were American Society of Anesthesiologists grade I-III. They had undergone either laparoscopic or open surgery, usually with both general anaesthesia and EA.

Outcomes assessed in the review
Studies were eligible if they reported duration of hospital stay (the primary outcome of the review); post-operative pain scores at 24 and 48 hours, measured by a visual analogue scale (VAS); time to recovery of bowel function; incidence of anastomotic leakage; incidence of morphine- or EA-related side-effects; or incidence of cardiac or pulmonary complications.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality

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Two authors assessed study validity and resolved any disagreements by discussion or by consultation with a third assessor. They used an 8-point scale (the Oxford Modified Scale) that allocated points for randomisation, allocation concealment, blinding of the patients, providers and observers, handling of losses to follow-up, and intention-to-treat analysis.

**Data extraction**
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

For dichotomous data, an odds ratio (OR) and 95% confidence interval (CI) were calculated. For continuous data, a mean and standard deviation were extracted or estimated from the reported data. Analysis was conducted by intention-to-treat, calculated from the original data if necessary. Authors were contacted when additional information was required.

**Methods of synthesis**
*How were the studies combined?*
The studies were combined by meta-analysis, using RevMan software and a fixed-effect model unless there was statistically significant and unexplained heterogeneity, in which case a random-effects model was used. Pooled ORs with 95% CIs were calculated, along with associated p-values (level of significance p<0.05). For continuous data weighted mean differences (WMDs) were calculated, weighted by study size and variability. A funnel plot was constructed to check for publication bias.

*How were differences between studies investigated?*
Clinical sources of heterogeneity were investigated using a L'Abbe scatter plot and subgroup analyses. Subgroup analyses focused on studies in which: there was/was not a post-operative rehabilitation programme; the EA group had a catheter placed at the thoracic level; the EA group received only local anaesthetic plus opioid; the control group had a patient-controlled analgesia device; or the control group received parenteral morphine. Statistical heterogeneity was reported using the chi-squared test (level of significance p=<0.10) and the I-squared statistic.

**Results of the review**
Sixteen RCTs (n=806) were included.

The studies were generally small and of a poor quality. The median quality score on the Oxford Modified Scale was 2 out of a possible 8. Randomisation was poorly reported and outcome assessment was not blinded. The authors noted, as a factor that could potentially bias their findings, that duration of hospital stay was only a secondary outcome in most of the included studies and that time of discharge depends partly on non-clinical factors. The funnel plot suggested that there was no publication bias.

**Length of hospital stay.**
The pooled analysis of 13 RCTs (n=716) showed no significant difference between the study groups in the mean number of days in hospital (WMD 0.07, 95% CI: -0.40, 0.54). The L'Abbe plot indicated that duration of hospital stay was shorter in the more recently published studies that included a post-operative rehabilitation programme. There was very little inconsistency between the studies (chi-squared statistic, p=0.92; I-squared 0%) and none of the subgroup analyses significantly affected the results.

**Pain relief.**
Pain scores on a 100-point VAS were significantly lower in the EA groups at 24 and 48 hours (WMD -15, 95% CI: -19, -11, p=<0.001 and WMD -18, 95% CI: -26, -10, p=<0.001, respectively).

**Recovery of bowel function.**
Ileus was significantly reduced in the EA groups by a mean of 36 hours (WMD -1.55 days, 95% CI: -2.27, -0.84, p<0.001).

Morphine-related side-effects.

Pruritis (3 RCTs, n=119) and urinary retention (5 RCTs, n=205) were significantly more common in patients who received EA than in controls (OR 4.8, 95% CI: 1.3, 17.0, p=0.02 and OR 4.3, 95% CI: 1.2, 15.9, p=0.03, respectively). Rates of post-operative nausea and vomiting (5 RCTS, n=189) and sedation (2 RCTs, n=84) did not differ significantly between the groups.

Major post-operative complications (11 RCTS). Hypotension was significantly more common in the EA groups (7 RCTs, n=369; OR 13.5, 95% CI: 4.0, 57.7, p=<0.001). Rates of anastomotic leakage, cardiopulmonary complications and motor block were not significantly different.

**Authors' conclusions**

EA does not shorten the length of hospital stay after colorectal surgery, although it significantly reduces pain and shortens the duration of ileus. A multimodal rehabilitation programme may have more impact on length of hospital stay than a specific analgesic technique.

**CRD commentary**

The clinical question and inclusion criteria were clear and explicit, the literature search was adequate, potential publication bias was investigated, and the validity of the included studies was assessed and taken into account when interpreting the findings. It is not clear whether appropriate procedures were used to select the studies and extract the data, thus the potential for reviewer bias and error cannot be determined. The studies were pooled using appropriate statistical methods and potential heterogeneity was addressed. Despite the suboptimal quality of the primary studies, and some limitations in the reporting of the review methods, the findings were consistent, the review appeared to be generally well conducted, and the conclusions are likely to be reliable.

**Implications of the review for practice and research**

**Practice:** The authors stated that EA should be included in measures to shorten hospital stay after colorectal surgery, provided it is part of a structured recovery programme.

**Research:** The authors stated that future research on post-operative care and duration of hospital stay should concentrate on a global approach to patient management, rather than focusing on specific analgesic methods.

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